

**WHAT IS CLAIMED IS:**

1. A single mode optical amplifier, comprising;  
  
a single mode light source;  
  
a doped, pumped multimode fiber laser receiving an output from said light source;  
said fiber laser having a length exceeding 10 centimeters, and producing an output  
substantially in the fundamental mode of said fiber.
  
2. A single mode optical amplifier, comprising;  
  
a single mode light source; and  
  
a doped, pumped multimode fiber laser receiving the output of said light source, and  
having an output substantially in the fundamental mode of said fiber.
  
3. a single mode optical amplifier, comprising;  
  
a single mode light source; and  
  
a doped, pumped fiber laser receiving an output of said light source, and exhibiting a  
gain-guiding characteristic.
  
4. An optical amplifier, comprising;  
  
a source of single-mode light pulses having sub-picosecond pulse width; and  
  
a fiber amplifier for increasing the pulse energy of said pulses to greater than 160  
microjoules.

5. An optical amplifier system, comprising;

a laser diode pumped source;

an actively Q-switched micro laser receiving the output of said laser diode; and

a Yb fiber laser coupled to the output of said micro laser, said fiber laser including a multimode Yb doped fiber obtaining single mode amplification at an output thereof.

6. An optical amplifier, comprising:

a Q-switched microlaser,

a Yb fiber laser, and

a mode coupler for coupling output light from said microlaser into a fundamental mode of said Yb fiber laser.

7. An optical amplifier, comprising:

a Q-switched source of substantially single mode light; and

a gain guided fiber laser for amplifying said single mode light.

8. An optical amplifier, comprising:

a single mode light source; and

a multimode fiber amplifier employing gain guiding to propagate the output of said fiber amplifier in single mode.

9. An optical amplifier, comprising:  
  
a source laser generating output light; and  
  
a multimode, cladding-pumped fiber amplifier which is essentially dispersion free in the amplifier operating range.

10. An optical amplifier system adapted to be used in replacement of Nd:based lasers and particularly Nd:YAG, comprising:  
  
a microchip laser source; and  
  
a Yb:based multimode fiber amplifier receiving an output of said microchip laser and producing an output substantially in the fundamental mode of said fiber.